UHF Cognitive Radio Certification Discussion

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Agenda

1) Overview NPRM (personal/portable devices)

2) Solution configurations

3) Proposed Rule modifications

4) Certification Requirements

5) Discussion Items, Questions

6) Next Review Meeting

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NPRM Overview – Personal Portable Devices

1) Requirements Summary

   1) Operation on a non-interfering basis to licensed (broadcast) services

   2) Devices should use "listen before talk" protocol

   3) Devices capable of using a "control signal" for channel use identification

   4) Operating Frequencies: VHF/UHF (channels 5-51, minus channel 37)

   5) Channelization: 6 MHz

   6) Devices must protect against co-channel interference

   7) Channel selection process is autonomous (no user control)

   8) Spurious emissions in accordance with 15.209(a)

   9) Maximum output power: 100 mW (plus 6 dBi antenna gain)

   10) Devices are required to periodically transmit unique identification signal

   11) Devices required to have software download capability

   12) Devices required to have malicious software modification immunity

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Proposed Personal/Portable Rule Modifications

1. All devices have sensing

2. Devices use "listen before talk" protocol

3. 2 or more devices collaborate before choosing vacant channel

4. Maximum transmit power: 100 mW (0 dBi omni antenna)

5. All devices have "transmit power control" (TPC)

6. Frequency range: Channels 21-51 (minus channel 37), channel selection is autonomous, and not under user control

7. Adjacent channel spurious emissions: -46 dBc

8. The antenna is not permanently attached

9. Devices protect licensed broadcast services (operate on a non-interfering basis) within a 3 meter range

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Certification Requirements

1. Sensing
   1. Describe spectrum sense mechanism, and demonstrate results; verify against spectrum analyzer results
   2. Describe multipath fading mitigation techniques; demonstrate operation
   3. Describe threshold determination and demonstrate level set technique
   4. Describe coordination mechanism and demonstrate operation (2 devices)

2. Operating Frequencies:
   1. Demonstrate no operation on channels outside of 21-36, and 38-51
   2. Measure transmission mask on spectrum analyzer or equivalent
   3. Measure spurious emission compliance to 15.209(a)

3. Output Power:
   1. Demonstrate maximum output power
   2. Demonstrate TPC range

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Certification Requirements

4. Antenna:
   1. Measure antenna pattern, identify maximum gain for configuration
5. Software:
   1. Describe software download mechanism
   2. Describe download protection mechanism
   3. Describe unique identifier mechanism, and demonstrate operation

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Questions, Discussion Items

1. FCC's willingness to test/certify a UHF device with limited deployment before the rules have been finalized

2. Timeframe ~15 months

3. What unique testing needs to be done for UHF Cognitive Radios?

4. What are the major concerns with the operation of these solutions?

5. Collaborating with companies to define specification for devices, what would the FCC like to have embedded in devices?
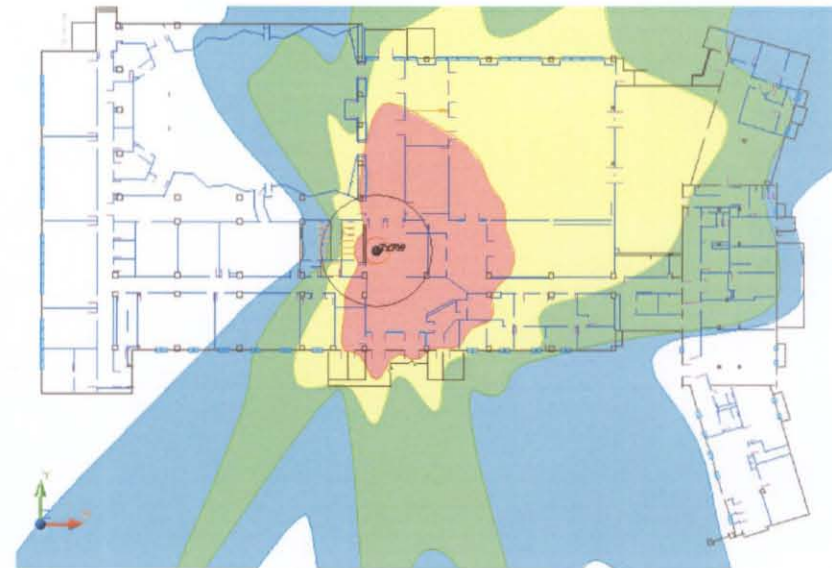
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UHF Coverage Benefits

WiFi 5GHz Band
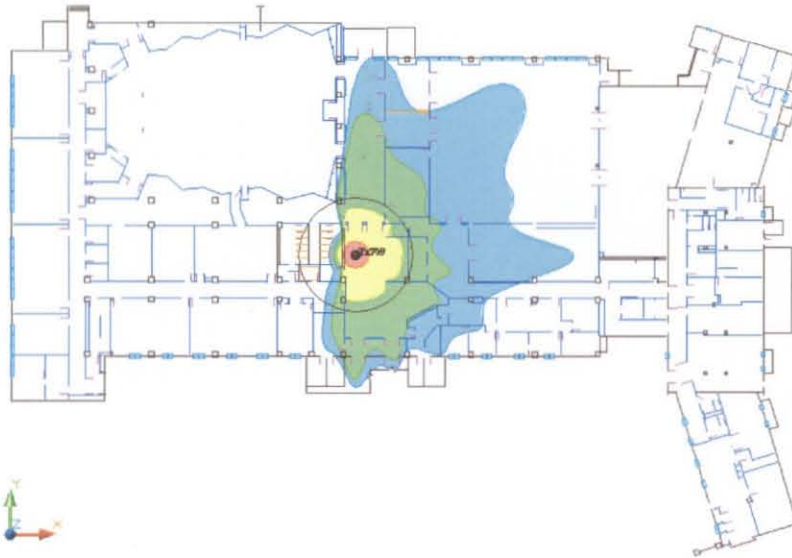
UHF 500 MHz Band

- RF Simulation (Wireless Valley Enterprise Planner)
- Hotel facility with single transceiver
- Omni-directional antenna, 0 dBm output power

Tx709_-50.0_dBm_RSSI, 8.1 sq. m (86.9 sq. ft)
Tx709_-60.0_dBm_RSSI, 90.1 sq. m (970.1 sq. ft)
Tx709_-70.0_dBm_RSSI, 298.3 sq. m (3211.0 sq. ft)
Tx709_-80.0_dBm_RSSI, 813.5 sq. m (8757.0 sq. ft)

Drywall or sheetrock
Cubicle wall
Wooden door
Elevator or metallic obstacle
Glass door or window, no doping
Brick, concrete, or concrete block
Basement or foundation wall
Metallic rack

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